Credibility: Connections between linguistic and cognitive development

A Senior Honors Thesis

Presented in Partial Fulfillment of the Requirements for graduation *with research distinction* in Psychology in the undergraduate colleges of The Ohio State University

By

Elaine Aldana

The Ohio State University
June 2009

Advisor: Assistant Professor, Laura Wagner, Department of Psychology

Abstract

This study explores whether children use a linguistic cue, accent, in deciding which people are credible information sources. Previous research has shown that children will preferentially select a fellow native language speaker as a friend over a non-native speaker, even if the native speaker is of a different race (Kinzler, Shutts, DeJesus, & Spelke, 2009). If a shared native language can improve how socially desirable a person is, it might also improve other social attributes, particularly that person's credibility. Here, an ambiguous situation within an overimitation task is used to test credibility. Previous research has also suggested that the irrelevant actions of overimitation may have been interpreted as inexplicably necessary, and often persist through later demonstrations even if the child is explicitly instructed only to do necessary actions (Lyons, Young, & Keil, 2007). It is expected that children will be more likely to imitate unnecessary behaviors demonstrated by a native speaker than those shown by a foreign accented speaker, and that this bias might persist into the future.

A total of 96 monolingual English-speaking participants (5-year olds, 6-year olds, and adults) watched a series of videos about two girls, one who was a native English speaker and the other a Spanish-accented English speaker. After watching the girls demonstrate two differing methods to retrieve a prize from a novel toy, participants were asked to retrieve the prize from the toy themselves, and then demonstrate their method to a naïve viewer. As expected, 5- and 6-year olds tended to follow the native speaker significantly above chance, while adults showed a lack of preference for either speaker. In all groups, there was no significant difference in method between the first retrieval and the demonstration retrieval.

Introduction

During early cognitive and linguistic development, children rapidly incorporate staggering amounts of information into their worldview. To do this efficiently, they must become selective about whom to pay attention to, and whom to ignore. This study investigates if children make inferences from a person's speech accent about whether or not they are a credible in cultural matters. If children do use accent to decide who is a credible information source, are they much more willing to learn information from this credible person than someone else? If this is the case, and if children pass on what they learn to other people, this could be interpreted as a mechanism for transmission of cultural knowledge.

It has been shown that children coordinate language information to information about social group membership, including non-linguistic categories (Hirschfeld & Gelman, 1997). Children are able to use language information to help define racial and ethnic stereotypes, and in a distinct way from non-independent group characteristics like age or gender. In Hirschfeld & Gleman's (1997) study, preschoolers were able to infer that people speaking an unfamiliar language are likely to live in unfamiliar homes and wear unfamiliar clothing. It follows that children should also be able to reason, conversely, that speakers of their own language are likely to share a similar culture, and would therefore be knowledgeable about their culture. It is reasonable to think that whatever process would inform such an assumption might have implications for other aspects of social learning.

Kinzler, Shutts, DeJesus, & Spelke (2009) show that for young children, speech accent can have an impact on a person's social desirability. In the first of a series of experiments, 4- and 5-year-old children watched videos that introduced native English and native French speakers, and asked children which of the two they would rather be friends with. French and American

children both tended to choose the speaker who shared their own language. Although the next experiment used a native speaker and a foreign-*accented* speaker, children still preferred to be friends with the fellow native language speaker. An additional experiment showed that children had no trouble understanding the foreign-accented speech. In a final variation, this native language preference was compared to another cue, race. By crossing the native and foreign accented speech with Caucasian and Black speakers, Kinzler, Shutts, DeJesus, & Spelke (2009) found that children's preference for fellow native speakers is stronger than their preference for racially similar speakers. This places speech accent into context in the literature, showing that as a social cue it ranks in strength among other more extensively researched ones, like race.

If a child's social preferences can be guided by speech accent, and if that child also believes linguistic similarity predicts cultural similarity, this child should be able to use speech accent to decide whether someone is presenting nonlinguistic but culturally-specific information consistent with their own culture. A study by Kinzler, Corriveau, and Harris (in press) showed that children used speech accent to decide which of two speakers to trust had demonstrated the correct function for a novel object. 4- to 5-year-old children were introduced to a native English speaker and a Spanish-accented English speaker, who demonstrated conflicting functions for a novel object. After watching both proposals, children were asked to endorse one of the functions. A second experiment provided additional evidence that accent was used, and not intelligibility. In a clever twist, both the native English and Spanish-accented speakers recited the poem "Jabberwocky, " by Lewis Carroll. Although neither speaker provided comprehensible verbal information, children still tended to endorse the function proposed by the native English speaker. Kinzler, Corriveau, and Harris (in press) argue that this tendency to endorse one

function out of a group of possible functions based on a native speaker's testimony is a model for learning culturally specific information from fellow native speakers.

This experiment focuses on how children might use speech accent when learning nonfunctional information. The use of nonfunctional information is intended to represent learning social norms and cultural traditions. Consistent with the findings of Kinzler, Corriveau, and Harris (in press), it is expected that native English-speaking children will preferentially follow nonfunctional steps in instructions presented by a fellow native English speaker over competing nonfunctional steps over instructions presented by a foreign-accented English speaker. This will be investigated using an overimitation task that pits two clearly inefficient methods against each other.

Overimitation refers to a tendency of young children to reproduce someone else's actions exactly, even when the actions are visibly inefficient or illogical (Lyons, Young, & Keil, 2007). Previous overimitation research has shown that even 14-month-old infants will recreate all actions along the way to a goal, even if imitation is deferred until well after the original observation (Meltzoff, 1988). In contrast, it is well known that chimpanzees exhibit emulative learning, showing little or no concern for the specific method as long as the outcome is the same (Call, Carpenter, & Tomasello, 2005). This emphasizes the significance of the overimitation bias to cultural learning, as it could be argued that chimpanzees' apparent lack of overimitative behaviors is related to their inability to learn human culture.

How closely young children imitate depends on their understanding of an action or event. In particular, if a given model behaves irrationally, with unclear goals, a child is likely to imitate every movement exactly, even without knowing the reason for it (Gergely, Bekkering, & Kiraly, 2002). In this study, 5-year-olds watched an experimenter turn on a touch lamp by leaning

forward and using their forehead. For some children, the experimenter's hands were free, as would be expected. For the rest of the children, the experimenter's hands were visibly restrained, and were wrapped up under a blanket. In general, children also used their forehead to turn on the touchlamp only if the experimenter's hands were free; otherwise, the children simply used their hands. The fact that children who saw the experimenter's hands were free chose to use their foreheads is strong evidence that they believed the experimenter must have had a rational reason for using her forehead, even if it was causally opaque. In contrast, the other children likely reasoned that the experimenter used her forehead because her hands were wrapped up, and inferred that she would have used her hands if they were free. This constitutes additional evidence of children's tendency to overimitate and reproduce eccentric, causally opaque actions.

In children, the overimitation bias is a powerful effect, to the point that 3- to 5-year-old children may be unable to eliminate unnecessary motions once they have been encoded as inexplicably necessary. In one study, children were specifically instructed to free play however they wanted, only to do necessary actions, or to compete in a timed race where overimitation would impede performance (Lyons, Young, & Keil, 2007), and yet overimitative behaviors were shown to persist.

The last component to be considered in this research is the continued transfer of cultural information. After children have learned cultural information, potentially through imitation of a fellow native speaker, it is necessary that they continue to pass on that information to people around them if that information is to persist through time. Flynn, & Whiten (2008) used diffusion chains, with successive imitation and demonstration by groups of children, to model the preservation and transmission of functional information over several generations.

In the present experiment, unnecessary actions within competing methods for prize retrieval will be used in an overimitation task to explore the effect of accent on learning non-functional information. If two methods are pitted against each other, it is expected that children will be more likely to reproduce a method presented by a fellow native speaker over a competing method presented by a foreign speaker. In addition, children's preference for the native speaker's method should extend to subsequent instances of the task, including a demonstration for a naïve viewer. If this is the case, this experiment will provide support for the idea that social learning and transmission of cultural information occurs selectively, and can be informed by speech accent.

Method

Participants

The original sample of 5 and 6 year-old participants included 80 children. Five participants were dropped because of bilingual ability and 7 participants were dropped because of significant contact with a bilingual caregiver, both as reported on a language experience survey. Four more participants were dropped because of experimenter error. The final 5- to 6-year-old sample consisted of 32 males and 32 females (N=64, M=6 years), all of whom were monolingual English speakers. All participants were recruited from the Columbus, OH area, either through the Center of Science and Industry (COSI), or through the Developmental Language and Cognition Lab at the Ohio State University.

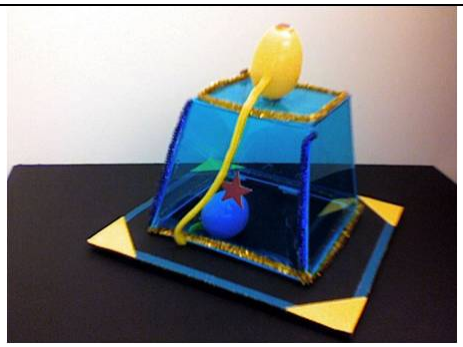
A separate sample of 37 adults was recruited through the Ohio State University REP pool. Five participants were dropped because of bilingual ability. The final sample for the adult group consisted of 16 males and 16 females (N=32, M=19 years), all monolingual English

speakers. Signed consent was obtained, and all participants received credit towards the research experience requirement of an introductory psychology course.

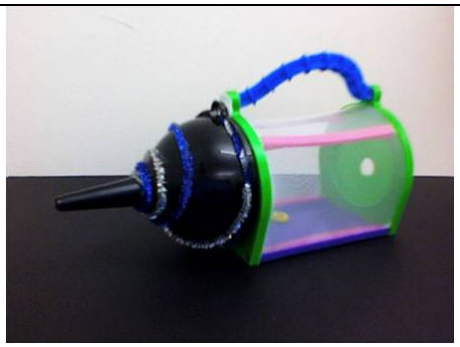
Materials

Four novel toys were constructed, all of which contained a small prize to be retrieved. For each toy, two retrieval methods were devised so that they shared necessary actions, and only differed in their unnecessary actions (Figure 1). The first toy ("Blue Cube," Figure 1a) is an inverted, plastic bin with a yellow plastic egg affixed to the top. A cord connects the top egg to a second egg, which is stored underneath the cube. The cube is attached to a board by one edge, so that it is easily tipped on its side to release the inner egg. The second toy ("Bug Catcher," Figure 1b) is a standard bug catcher toy, with a funnel attached with Velcro to cover a swiveling door. The opposite end of the toy has a hole drilled into to fit the spout of the funnel, as well as Velcro to attach the bell of the funnel. The third toy ("Spinner," Figure 1c) is a flat box top with two handles. One handle is a clear bulb attached at the top face, while the other is a plastic tube extending from the side. A decorative target is on the box, next to the bulb handle. The fourth and final toy ("Spiral Drum," Figure 1d) is a hollow, closed cylinder with a removable lid.

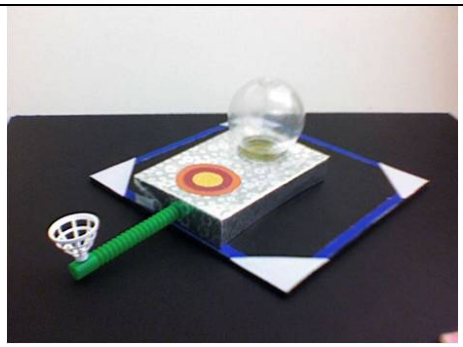
Figure 1: Four novel toys and their associated methods



a) Blue Cube
1. Lift box
2. Unnecessary action: tap egg on *blue box/yellow egg*
3. Open egg



b) Bug Catcher
1. Remove funnel
2. Unnecessary action: attach funnel by *Velcro/hole*
3. Open door



c) Spinner
1. Unnecessary action 1: spin by *green handle/clear bulb*
2. Unnecessary action 2: *scratch box/knock on bulb*
3. Remove box

d) Silver Tube
1. Unnecessary action 1: Beat *sides/top*
2. Unnecessary action 2: *Roll/Shake*
3. Remove lid

Demonstration videos were created in Final Cut Pro. Two Caucasian actresses were videotaped performing both methods for all four toys. A native English speaker from Columbus, OH and a Spanish-accented English speaker recorded two sets of verbal instructions to correspond with both methods for all four toys. The video and audio files were digitally combined afterward to effectively counterbalance accents, methods, and actresses. The completed videos were displayed on a laptop.

Design

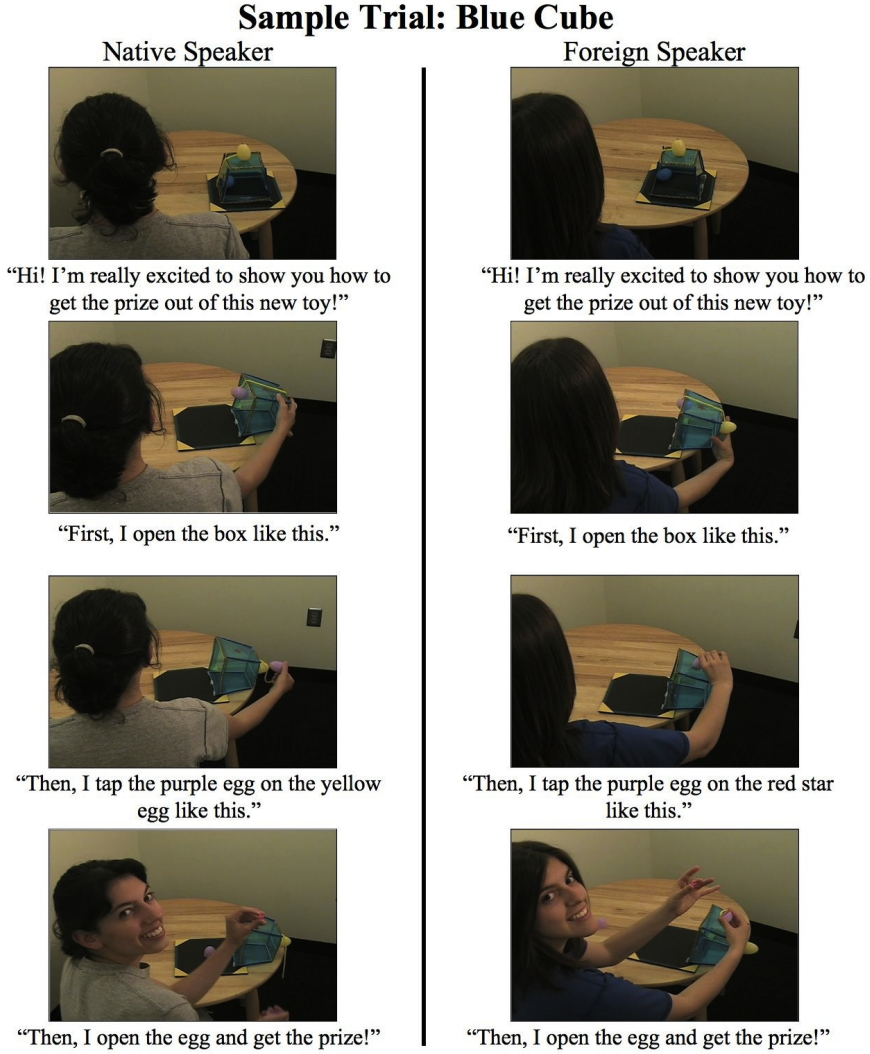
16 separate conditions were created in order to counterbalance two accents (Native and Spanish accented English), two sets of retrieval methods, two orders of toy presentation, and two actresses. Within each age group, male and female participants were distributed evenly among conditions.

Procedure

Each subject participated in the study independently. The experimenter explained to each subject that she has two friends who like to play with new toys, and that she would like to introduce them so that they can show the subject how to play with the toys. The first pair of

videos familiarized the two speakers, one who spoke native English and the other who spoke English with a Spanish accent. During the second pair of videos, participants watched the speakers demonstrate differing retrieval methods for the first toy. A sample of one video pair for a toy is depicted in Figure 2. Next, the participants were presented with the toy depicted in the video, and were encouraged to try retrieving the prize themselves. This will be referred to as the *First Imitation* event. After successful retrieval of the prize, the participants were asked to demonstrate their method again, this time for a naïve observer. This second toy session will be referred to as the *Transmission* event. This process alternated each pair of instructional videos for a given toy with a play trial with that toy, and was repeated for the three remaining toys.

Figure 2: Sample Trial



All trials were video recorded for off-line coding. Up to three unnecessary actions per toy were scored from 0 to 1, with 0 indicating an action following the foreign speaker, 0.5 indicating no speaker followed, either through invention of a new action or omission of unnecessary actions, and 1 indicating a action following the native speaker. These action scores were averaged to give a imitation preference score for each toy, and the four toy scores were averaged to give an overall imitation preference score for each child.

Results

No significant differences between 5-year-old and 6-year-old children were found, so they have been collapsed across all dimensions for data analysis.

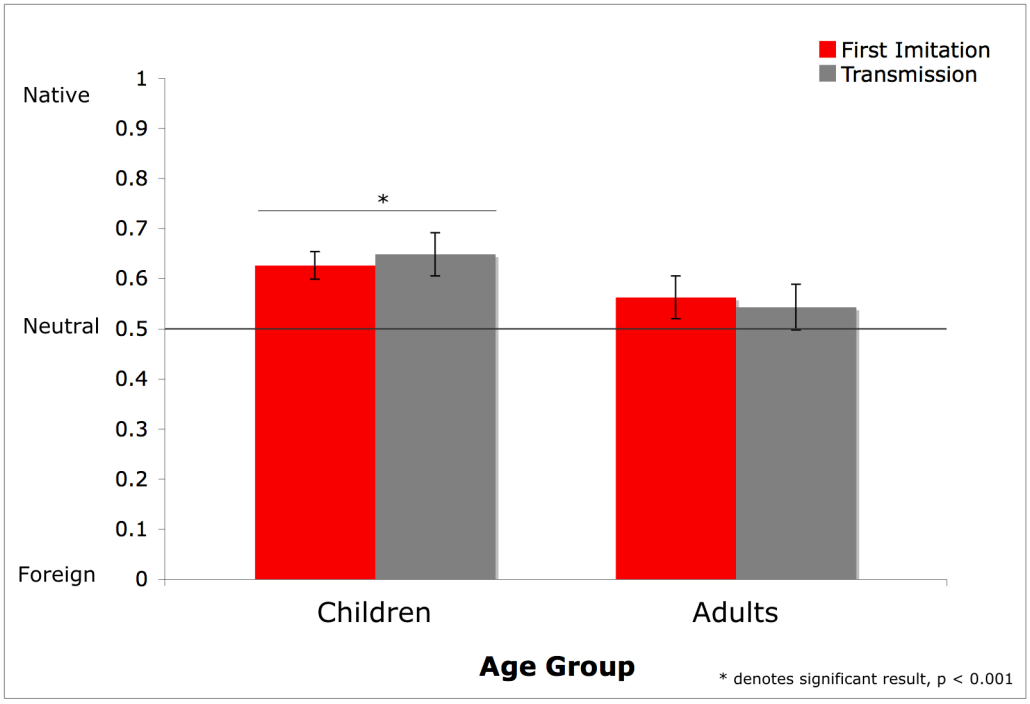
Extremely high correlations were found between the Imitation Preference scores for First Imitation events and Transmission events, R=0.796 for 5 and 6-year-olds, and R=0.855 for adults. Subsequent paired samples t-tests also showed no significant differences between First Imitation and Transmission event, with t-values $t(63) = -1.275$, n.s. for 5 and 6-year olds, and $t(31) = 0.818$, n.s. for adults. Because both children and adults were highly consistent in their retrieval method, all following data analysis considers Imitation Preference scores from the First Imitation events only.

Overall, the 5- and 6-year old group preferred to imitate the native accented speaker over the foreign-accented speaker, with a one sample t-test showing their imitation preference scores were significantly above chance, $t(63) = 4.542$, $p < .001$. However, a similar one sample t-test on the adult group's overall imitation preference scores did not reveal a significant difference from chance, $t(31) = 1.462$, n.s., indicating a lack of preference for either speaker.

To ensure that this was not simply an effect of the means, the averaged Imitation Preference Scores per toy were also computed in several alternative ways besides a direct mathematical average, including a mathematical average based on first action only, and a mathematical average that "penalized" for missing actions. Because all of these schemes returned results significant at an α level of .001, only the direct average will be considered.

Of the 64 5-6-year-old children, 95% included some form of unnecessary actions in their method. Similarly, 98% of adults also included unnecessary actions.

Figure 3: Overall imitation preference scores by age group



Counterbalancing factors for children and adults were submitted to one-way ANOVAs to investigate a possible effect on the overall imitation preference scores. Five dichotomous factors were under analysis: sex of participant, order of toy presentation, order of accents heard, order of actresses seen, and order of model (actress with accent). None of these factors were found to have a significant effect on overall imitation preference scores. F values are reported in Tables 1 and 2.

Table 1: F-values for counterbalancing factors, 5 and 6-year-olds

Factor	**F value**	**df**	**Sig.**
Sex of Participant	1.255	9, 54	0.283
Toy Order	1.266	9, 54	0.276

Accent Order	0.506	9, 54	0.863
Actress Order	1.183	9, 54	0.324
Model Order	0.681	9, 54	0.722

Table 2: F-values for counterbalancing factors, adults

Factor	**F value**	**df**	**Sig.**
Sex of Participant	0.517	6, 25	0.790
Toy Order	1.462	6, 25	0.232
Accent Order	1.132	6, 25	0.373
Actress Order	0.988	6, 25	0.454
Model Order	1.462	6, 25	0.232

Discussion

The main research questions posed in this study are 1) Do children use accent to determine who is a credible information source, 2) Can their use of accent as a cue for credibility be demonstrated by an overimitation task, 3) Can unnecessary actions from the overimitation task carry through to future demonstrations of the task, as a stand-in for cultural transmission? Overall, the results suggest that the answer to all three of these questions is yes. As expected, children tended to follow the method presented by the native-accented speaker over the method demonstrated by the foreign-accented speaker, both when they first retrieve a prize from the toy, and when they show a naïve viewer how to retrieve the prize. The irrelevant information was replicated by children almost all of the time in the First Imitation event, and carried through to the Transmission event. Adults, on the other hand, did not demonstrate any preference for either

the native or the foreign speaker, although they also replicated irrelevant information nearly all of the time. Children's selective perseveration of nonfunctional behavior learned from a fellow native speaker is consistent with a mechanism for early cultural learning.

Clearly, children demonstrate a bias for befriending and imitating fellow native-speakers, and there are many possible reasons why this happens to be the case. As discussed by Hirschfeld & Gelman (1997), this bias could be a direct mapping of language onto ingroup versus outgroup distinctions, with children favoring fellow ingroup members or derogating outgroup members as perceived by language. This idea is somewhat extended by Kinzler, Corriveau, and Harris (in press), who claim that children infer cultural conspecificity from shared native accent, and as such, fellow native speakers are especially trustworthy.

The disparity between children's significant native-speaker preference and adult's apparent lack thereof suggests that there may be a developmental process at work, that might be explored in the future. Although adults did not demonstrate a preference for either speaker, it is possible that the task was too simple, and the manipulation so obvious that some participants maybe have taken extra care not to appear biased against foreigners. One subject reported that although he knew the experimenter "wanted" him to avoid the speaker with an accent, he claimed that it had no effect on his behavior. In addition, although all adult participants were reported to be monolingual English speakers, all were students at a large research university, with frequent exposure to instructors and authority figures who are non-native English speakers. It would not be surprising if a future study found a similar native-accent bias in adults with a more age-appropriate task and significant cognitive load. It would be interesting to see if such a bias were also present in an adult sample from a less racially and ethnically diverse area.

This experiment focuses on the effect of foreign accent specifically on a speaker's credibility to typically developing preschool-age children. In the future, the project may be extended to cover other linguistic cues, such as speed of speech, use of slang, or register. An interesting future study would be to see what results when the connection to culture is made more salient than through accent alone, perhaps through placement of either exotic or familiar items in the actresses' environment. It would also be interesting to see if there are differences in how accent is processed as a social cue, by individuals with disorders affecting social reasoning, such as autism.

Currently ongoing research is investigating how this accent-based bias is affected when the speaker's actual credibility is manipulated. If either the native speaker or the foreign-accented speaker is demonstrably less confident in their own method, it is possible that itwould interact with the native-speaker preference found in this experiment. If there is an interaction between actor confidence and accent, it would likely still be the case that children would be more likely to follow a confident native speaker over a confident foreign-accented speaker, but it would also be possible that children will be almost as likely to follow an unconfident native speaker over a confident foreign-accented speaker. As always, it will be interesting to see what other research questions these future studies will create.

References

Call, J., Carpenter, M., Tomasello, M. (2005). Copying results and copying actions in the process of social learning: Chimpanzees (Pan troglodytes) and human children (Homo sapiens). *Animal Cognition,* 8(3), 151-163.

Flynn, E., & Whiten, A. (2008). Cultural transmission of tool use in young children: A diffusion chain study. *Social Development*, 17(3), 699-718.

Gergely, G., Bekkering, H., & Kiraly, I. (2002). Rational imitation in preverbal infants. *Nature*, *415*(6873), 755.

Hirschfeld , l., & Gelman, S. (1997). What Children Think About the Relationship Between Language Variation and Social Difference. *Cognitive Development*, 12, 213-238.

Kinzler, K., Corriveau, K., & Harris, P. (in press). Children's selective trust in native-accented speakers. *Developmental Science.*

Kinzler, K., Shutts, K., DeJesus, J., & Spelke. E. (2009). Accent trumps race in guiding children's social preferences. *Social Cognition*, 27(4), 623-634.

Lyons, D., Young, A., & Keil, F. (2007). The Hidden Structure of Overimitation. *Proceedings of the National Academy of Sciences,* 104(50), 19751-19756.

Meltzoff, A. (1988). Infant Imitation After a 1-Week Delay: Long-Term Memory for Novel Acts and Multiple Stimuli. *Developmental Psychology,* 24(4), 470-476.